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ABSTRACT

Interests and abilities have been cited as important concepts in the career guidance of adolescents. While it is important for students to understand these constructs independently, particularly if they are not congruent, their complex relationship can make it difficult to combine the information into career directions. This paper considers a computerized approach to combining aptitudes and interests into a single report that can be used by the student and as an aid to school counselors. The Ball Career System, an aptitude based career exploration tool for high school students, includes a means to connect student's aptitude profile to occupational clusters in the Aptitude Pattern Indicator (API). Ninth graders (N=1,633; 50.4% male; 49.6% female) from 3 high schools in the Midwest completed the Ball Aptitude Battery to compare interests and the API aptitude recommendations. Each student's API aptitude recommendation was compared to his or her API interest recommendation. The results show evidence of gender and aptitude differences across the API interest clusters. As interests and aptitudes do not have a simple relationship, students need to understand both. A report that could combine the two would help simplify career exploration, both for the student and the school counselor. (JDM)

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Combining Interests and Aptitudes into Career Recommendations

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The Ball Foundation

Glen Ellyn, Illinois

Poster presentation for Division 17 of American Psychological Association at annual conference, August 2000 at Washington, D.C.

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Combining Interests and Aptitudes into Career Recommendations

Interests and abilities have been cited as important concepts in the career guidance of adolescents. One of Ginzberg's stages of career development is the capacity stage in which 13 to 14 year olds "realize that ability and aptitude must be considered along with interest when making career plans" (Seligman, 1994, p. 215). A career guidance objective for adolescents proposed by the Pennsylvania Department of Education is to "understand how interests…and abilities affect the career choice" (Herr and Cramer, 1996, p. 393). Paisley and Hubbard, in Developmental School Counseling Programs: From Theory to Practice (1994), list becoming aware of personal characteristics, interests, aptitudes, and skills as an overall career goal for grades 6-9 (as cited on American Counseling Association website, 1999).

Research has shown that the relationship between interests and abilities is complex (e.g., Carson, 1998). While it is important for students to understand these constructs independently, particularly if they are not congruent, their complex relationship can make it difficult to combine the information into career directions. Additionally, school counselors with large case loads may not have the time to provide individualized career suggestions for each student. Therefore, this paper considers a computerized approach to combining aptitudes and interests into a single report that can be used by the student and as an aid to the school counselor.

The Ball Career System™, an aptitude based career exploration tool for high school students, includes a report that connects the student's aptitude profile to occupational clusters - the Aptitude Pattern Indicator™ (API™; see Appendix A).

The occupational recommendations in the API are reported two ways. First, minimum qualification ratings are determined for 66 work groups defined by the Guide for Occupational Exploration (GOE). Second, "best fit" recommendations are determined for 12 occupational clusters originally defined by Gottfredson (1986). The United States Employment Service determined minimum cut offs for 3-4 aptitudes as measured by the General Aptitude Test Battery (GATB) for each of the work groups. Gottfredson organized the 66 GOE work groups by their GATB aptitudes and cut-offs into 12 clusters. The Ball Foundation™ uses a modified version of Gottfredson's organization in the API, resulting in 4 occupational families - Physical, Artistic, Information, and Social - and 12 clusters. Within each family the clusters are arranged in order of complexity (except for Artistic). The Physical family has 4 clusters, with Physical 1 (P1) being the most complex and Physical 4 (P4) the least complex. The same is true for Social 1 (S1) through Social 3 (S3) and Information 1 (I1) through Information (I3). The Artistic cluster is divided into two clusters that capitalize on different key aptitudes (verbal and spatial) rather than reflecting complexity.

This report compares interests and the API aptitude recommendations.

Method

Participants

Participants were 1633 ninth graders from three large high schools in the Midwest region with a mean age of 14.25 years. The sample was 50.4% male and 49.6% female. The ethnicity breakdown was 10.3% Asian American/Pacific Islander, 4.7% Black/African American, 6.6% Hispanic/Latino American, 1.3% Native

American/American Indian, 75.5% White/European American, and 4.3% Other/Multicultural.

Instruments

The students took 12 aptitude tests included in the Ball Aptitude Battery® (BAB™) as part of the Ball Career System. The BAB has proven reliability and validity (The Ball Foundation, 1998). The Chronicle Career Quest®, an interest inventory, was also administered. The Quest also has proven reliability and validity (Chronicle Guidance Publications, 1992).

Procedure

The Ball Career System incorporates probablistic neural networks to model expert counselor judgment in determining which API clusters suggest the best aptitude fit for each student. The neural networks produce a 0 or a 1 (recommended or not) for each of the 12 API clusters. A 0 indicates the aptitude profile is not a "best fit" for that cluster, it does not necessarily indicate that the aptitudes are low.

Interest scores were generated for each API cluster by averaging the Quest items that fit under each cluster. For each student, the API interest score was compared to the student's overall average interest score. If the API interest score was higher than the student's overall average, a 1 (recommend) was assigned to the API cluster, and if the API interest score was equal to or lower than the overall average, a 0 (not recommend) was assigned to the API cluster.

Each student's API aptitude recommendation was compared to his or her API interest recommendation. If the API aptitude recommendation was 1 (aptitude best fit) and the API interest recommendation was 1 (high interest), the API cluster was assigned

a "green light". If the API aptitude recommendation was 0 (not an aptitude best fit) and the API interest recommendation was 0 (low interest), the API cluster was assigned a "red light". If the API aptitude recommendation was 0 (not an aptitude best fit) and the API interest recommendation was 1 (high interest), the API cluster was assigned a "yellow light". Finally, if the API aptitude recommendation was 1 (aptitude best fit) and the API interest recommendation was 0 (low interest), the API cluster was assigned a "turn signal".

Results

Table 1 shows the frequency of traffic light recommendations for the 12 API clusters by gender and for the total sample. Not one student received all green, all red, all yellow, or all turn signals. The percentages suggest there are some gender effects. For example, more males than females received a red light or a turn signal for A2, and more females received a yellow light. More females than males received a red light or a turn signal for P3, and more males received a green light. These patterns seem to reflect gender differences found in Holland's RIASEC model (Harmon, Hansen, Borgen, Hammer, 1994).

Appendices B and C gives two examples of how a traffic light report may look for individual students.

Conclusion

It is evident there are gender and aptitude differences across the API interest clusters; further analyses are needed to explore the differences.

As interests and aptitudes do not have simple relationships, students need to understand both. However, a report that combines the two can help simplify career exploration, both for the student and the for the school counselor.

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Name:	SAMPLE	Date:	06-01-1998
ID:	R999999	Age:	13
Batch:	SAMPLE	Gender:	Female
Educ:	Completed Grade 8	Norms:	Standard
Group:	AVERAGE HIGH SCHOOL	Battery:	9SE

Ball Aptitude Pattern Indicator™ (API™)

How to Interpret This Report

The Ball *Aptitude Pattern Indicator (API™)* suggests career areas for you to explore based on your aptitudes. This report includes two types of ratings:

Best Aptitude Fit Ratings. The checked (☑) occupational clusters are suggested as starting points from which to begin your career exploration. These ratings take into account your overall aptitude profile. To find out more about these clusters, see the accompanying *Ball Career System Guide*.

Minimum Aptitude Fit Ratings. The dots (●) indicate the extent to which you met minimum aptitude requirements for the U.S. Department of Labor's Guide for Occupational Exploration (GOE) work groups. The H, M, and L ratings can be interpreted as follows:

H (High) -- Your aptitude scores are equal to or higher than those of workers judged to be satisfactory in jobs in that work group.

M (Moderate) -- Most but not all of your aptitude scores are equal or similar to those of workers judged to be satisfactory in jobs in that work group.

L (Low) -- Your aptitude scores are lower than those of workers judged to be satisfactory in jobs in that work group.

Keep in mind that these ratings take into account your aptitudes, but not your interests, values, personality or motivation.

PHYSICAL (P)

A family of occupations dealing with relationships among things

	GOE Work Group		L	M	H
☐ P1.					
	Physical Sciences	02.01	●		
	Life Sciences	02.02	●		
	Medical Sciences	02.03	●		
	Engineering	05.01	●		
☑ P2.					
	Laboratory Technology	02.04			●
	Managerial Work: Plants & Animals	03.01			●
	Managerial Work: Mechanical	05.02			●
	Engineering Technology	05.03			●
	Air & Water Vehicle Operation	05.04			●
☑ P3.					
	Craft Arts	01.06			●
	Craft Technology	05.05			●
	Quality Control	05.07			●
	Land & Water Vehicle Operation	05.08			●
	Crafts	05.10A			●
	Crafts	05.10B			●
	Equipment Operation	05.11			●
	Production Technology	06.01A			●
	Production Technology	06.01B			●
	Production Work	06.02			●
	Quality Control	06.03			●
	Barber & Beauty Services	09.02			●
	Passenger Services	09.03			●
☐ P4.					
	Animal Training & Service	03.03B			●
	Elemental Work: Plants & Animals	03.04			●
	Elemental Work: Mechanical	05.12			●
	Elemental Work: Industrial	06.04			●
	Vending	08.03			●
	Attendant Services	09.05			●

ARTISTIC (A)

A family of occupations dealing with the fine and applied arts

	GOE Work Group		L	M	H
☐ A1.					
	Literary Arts	01.01			●
	Performing Arts: Drama	01.03			●
	Performing Arts: Music	01.04		●	
☑ A2.					
	Visual Arts	01.02			●
	Performing Arts: Dance	01.05			●

INFORMATION (I)

A family of occupations dealing with processing information and maintaining order

	GOE Work Group		L	M	H
☐ I1.					
	Mathematics & Statistics	11.01	●		
	Finance	11.06		●	
☑ I2.					
	Safety & Law Enforcement	04.01			●
	Materials Control	05.09A			●
	Administrative Detail	07.01			●
	Mathematical Detail	07.02			●
	Financial Detail	07.03			●
	General Sales	08.02			●
	Regulations Enforcement	11.10			●
☐ I3.					
	Materials Control	05.09B			●
	Oral Communications	07.04			●
	Records Processing	07.05			●
	Clerical Machine Operation	07.06			●
	Clerical Handling	07.07			●
	Educational & Library Services	11.02B			●

SOCIAL (S)

A family of occupations dealing with social and economic relationships

	GOE Work Group		L	M	H
☐ S1.					
	Social Services	10.01			●
	Social Research	11.03A		●	
	Law	11.04A		●	
	Business Administration	11.05			●
	Services Administration	11.07			●
	Promotion	11.09			●
☑ S2.					
	Sales Technology	08.01			●
	Nursing, Therapy, & Specialized Teaching Services	10.02			●
	Educational & Library Services	11.02A			●
	Social Research	11.03B			●
	Law	11.04B			●
	Communications	11.08			●
	Business Management	11.11			●
	Contracts & Claims	11.12			●
☐ S3.					
	Animal Training & Service	03.03A			●
	Security Services	04.02			●
	Hospitality Services	09.01			●
	Child & Adult Care	10.03			●

See the accompanying *Ball Career System Guide* for more information about these ratings.

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Appendix B

Career Traffic Light Report for Jane Doe

	PHYSICAL *A family of occupations dealing with relationships among things*		***INFORMATION*** *A family of occupations dealing with processing information and maintaining order*
Turn Signal	**P1** Researching, Designing, & Modifying Physical Systems	**Green**	**I1** Designing & Modifying Information Systems
Turn Signal	**P2** Implementing, Operating, & Testing Physical Systems	**Yellow**	**I2** Maintaining Safety, Regulations, Records, & Inventory
Red	**P3** Crafting, Assembling, or Inspecting Objects; Setting Up, Operating, or Repairing Equipment & Vehicles	**Red**	**I3** Handling & Processing Information
Red	**P4** Attending Machines, Buildings, Plants, Animals, & Consumers		
	ARTISTIC *A family of occupations dealing with the fine and applied arts*		***SOCIAL*** *A family of occupations dealing with social and economic relationships*
Green	**A1** Creating & Performing in the Verbal Arts	**Green**	**S1** Researching, Planning, & Maintaining Societal Systems
Yellow	**A2** Creating & Performing in the Spatial Arts	**Green**	**S2** Educating, Persuading, & Helping Individuals
		Red	**S3** Serving for and Caring for Individuals

Your **traffic light signal** is listed next to each occupational group.

If it is ***Green, Go*** **To First** - Find out more about the careers listed under this group in your API. You have indicated that **your interests and abilities are good fits** into the careers in this group.

If it is ***Red, Stop*** – Give these careers less attention in your career exploration. You have indicated that **your interests and abilities are not the best fit** into the careers in this group.

If it is ***Yellow, Caution*** – Find out more about what is required for training in the careers listed under this group in your API. You have indicated that your **interests are a good fit** into the careers in your group.

If it is a ***Turn Signal, Check*** **This Out** – Find out more about the careers listed under this group in your API. You have indicated that your **abilities are a good fit** into these careers.

Appendix C

Career Traffic Light Report for John Doe

	PHYSICAL *A family of occupations dealing with relationships among things*		***INFORMATION*** *A family of occupations dealing with processing information and maintaining order*
Green	**P1** Researching, Designing, & Modifying Physical Systems	**Turn Signal**	**I1** Designing & Modifying Information Systems
Green	**P2** Implementing, Operating, & Testing Physical Systems	**Turn Signal**	**I2** Maintaining Safety, Regulations, Records, & Inventory
Turn Signal	**P3** Crafting, Assembling, or Inspecting Objects; Setting Up, Operating, or Repairing Equipment & Vehicles	**Yellow**	**I3** Handling & Processing Information
Red	**P4** Attending Machines, Buildings, Plants, Animals, & Consumers		
	ARTISTIC *A family of occupations dealing with the fine and applied arts*		***SOCIAL*** *A family of occupations dealing with social and economic relationships*
Turn Signal	**A1** Creating & Performing in the Verbal Arts	**Green**	**S1** Researching, Planning, & Maintaining Societal Systems
Turn Signal	**A2** Creating & Performing in the Spatial Arts	**Green**	**S2** Educating, Persuading, & Helping Individuals
		Red	**S3** Serving for and Caring for Individuals

Your **traffic light signal** is listed next to each occupational group.

If it is ***Green, Go*** **To First** - Find out more about the careers listed under this group in your API. You have indicated that **your interests and abilities are good fits** into the careers in this group.

If it is ***Red, Stop*** – Give these careers less attention in your career exploration. You have indicated that **your interests and abilities are not the best fit** into the careers in this group.

If it is ***Yellow, Caution*** – Find out more about what is required for training in the careers listed under this group in your API. You have indicated that your **interests are a good fit** into the careers in your group.

If it is a ***Turn Signal, Check*** **This Out** – Find out more about the careers listed under this group in your API. You have indicated that your **abilities are a good fit** into these careers.

Table 1

Percentage of Traffic Light Recommendations per API Group by Gender and Total Sample

	Males n = 823				Females n = 810				Total Sample N = 1633			
API Group	Green	Red	Yellow	Turn Signal	Green	Red	Yellow	Turn Signal	Green	Red	Yellow	Turn Signal
A1	16.6	25.6	50.4	7.3	28.3	20.0	46.7	5.1	22.4	22.8	48.6	6.2
A2	17.4	35.8	26.4	20.4	29.1	12.7	53.6	4.6	23.2	24.4	39.9	12.6
I1	9.6	54.4	18.6	17.4	6.9	55.9	21.0	16.2	8.3	55.2	19.8	16.8
I2	23.8	22.8	12.3	41.1	24.6	16.8	10.0	48.6	24.2	19.8	11.1	44.8
I3	4.6	59.3	7.2	28.9	14.4	43.2	17.2	25.2	9.5	51.3	12.1	27.1
P1	12.0	47.5	34.0	6.4	5.7	60.9	26.2	7.3	8.9	54.1	30.1	6.9
P2	17.6	33.4	14.9	34.0	16.7	37.2	18.5	27.7	17.1	35.3	16.7	30.9
P3	49.1	9.0	10.2	31.7	4.8	20.2	1.5	73.5	27.1	14.6	5.9	52.4
P4	9.2	55.0	11.4	24.3	8.0	47.8	21.2	23.0	8.6	51.4	16.3	23.6
S1	24.2	25.4	35.5	14.9	27.3	14.4	48.8	9.5	25.7	20.0	42.1	12.2
S2	31.6	17.3	21.4	29.8	45.7	10.6	28.9	14.8	38.6	14.0	25.1	22.4
S3	16.8	34.3	15.7	33.3	23.2	28.9	19.3	28.6	20.0	31.6	17.5	31.0

Note: Green = Aptitude Best Fit, High Interest; Red = Not an Aptitude Best Fit, Low Interest; Yellow = Not an Aptitude Best Fit, High Interest; Turn Signal = Aptitude Best Fit, Low Interest; API = Aptitude Pattern Indicator; A = Artistic; I = Information; P = Physical; S = Social